



SALMONID ENHANCEMENT PROGRAM

SEP UPDATE 1985

Canada

87-01494/

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Table of contents

DIRECTOR'S REPORT	1
SEP in 1985	
About this report	
The goals of SEP	
SEP expenditures by program	
OPERATION OF FACILITIES	4
South coast busy in 1985	
Preparing for the Expo fishery	
1985 coho smolt releases contributing to Georgia Strait sport fishery	
Mark Recovery Program uses catch statistics to unlock secrets for SEP	
SEP contribution to 1985 sport and commercial catches	
Engineering puts Shuswap hatchery into production	
Provincial participation on the Nicola	
Side channels for chum are producing a bonus of coho	
The "waterless" incubator	
ECONOMIC DEVELOPMENT	10
Sechelt hatchery fish come home to a spot in the ocean	
SEP at work in the communities	
PUBLIC PARTICIPATION	11
People are active in SEP	
Keeping the public eye on SEP	
PIPnews story	
To see is to understand	
RESEARCH ACTIVITIES	12
The white-coat brigade	
World-class research	
Fast food for sockeye	
1985 SEP FISH PRODUCTION	14
By project	
By program	
By species	



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Salmonid Enhancement Program
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SEP in 1985

As you will see, this report is substantially different from those which the Salmonid Enhancement Program has produced in the past. Some of these changes continue a direction that was established in 1984, such as providing new information on SEP contributions to the B.C. commercial and recreational fisheries. Others are new and were devised in response to developments that took place in 1985.

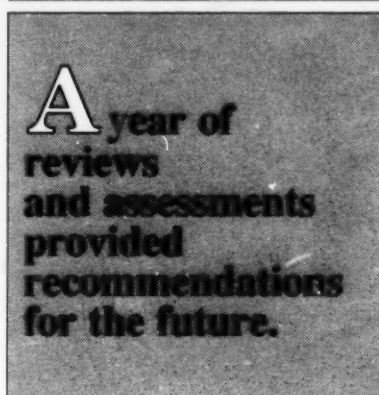
The year was one of change. Changes in senior Departmental personnel, changes in structure as the Department (and SEP) became responsible for elements that were previously administered by the International Pacific Salmon Fisheries Commission, and changes in the planning process as new economic concerns arose and new assessment procedures were implemented.

It was also a year of reviews and evaluations. The government undertook complete and thorough analyses of its operations and mounted a comprehensive effort to reduce spending. The Department of Fisheries and Oceans and SEP, as a major and highly visible program within the Department, were examined during 1985 by the Ministerial Task Force on Program Review and the Auditor-General. As well, we conducted our own thorough reviews of the economic and biological aspects of SEP as the program sought a continuation and expansion of government investment.

All of the reviews concluded that the program should continue and contained valuable information and recommendations to guide planning for SEP's future.

While these reviews went on, the various operations of the program continued; the search for new enhancement opportunities proceeded as did the construction of spawning channels and the modification and improvement of existing facilities. Lakes were fertilized and logjams removed, major facilities

and small public participation projects incubated eggs, produced alevins and reared them. Releases of fry and smolts made their contributions to the salmonid populations of waterways throughout the province. Community Economic Development projects continued their growth and produced results both in the tangible form of numbers of fish and the intangible form of increased knowledge and skill for those involved. Research sought ways to produce more and healthier fish. Public information and education



activities reached out into communities around the province through such efforts as the DFO public awareness campaign, and continued support to teachers. The maintenance and improvement of all enhancement activities remained the focus of staff efforts.

The long-term goals that were set in the early years of SEP remain in effect and the program continues to work towards each of them. The reviews referred to earlier concluded that

we were generally on target and the economic benefit projections were sound with a benefit-cost ratio of 1.3:1.

One of the goals of the program was to assist the less developed areas of B.C. These areas have benefitted since the first projects were undertaken; at first largely from construction activities but in recent years the operation and maintenance of facilities has been the most direct factor. Now the value of SEP-produced fish in the commercial, sport and Native catches is a growing economic benefit.

The program's goal of increased employment opportunities for Native people has also been served; many of the Community Economic Development projects are operated, under contract, by Native bands. Training has been undertaken and has greatly increased the skill levels in the communities. Self-sufficiency, community spirit and pride all accompany increased employment in these remote centres.

Overall employment opportunities are also increased by SEP. The program produces direct employment, adds to the economic base in many communities through the local purchase of goods and services, and also provides for increased income through its contribution of up to 14 percent of the catch in 1985 (as tracked by Mark Recovery statistics). While no direct assessment of the effects of the program on employment in the tourism industry has been undertaken, there is no doubt that sport fishing is a major attraction for tourists. The provision of services to that growing industry has become an important employment generator in many parts of the province.

The program continues to be an important component of DFO activities designed to achieve the greatest benefits from the resource in the Pacific Region.

A handwritten signature in black ink, appearing to read "H. Swan".

H. Swan
Acting Director, SEP

About this report

You will notice some changes in the style and format of this year's report. In part, these are in response to the government's determination to reduce costs. It is also our belief that you may find the information more interesting and timely.

The material presented covers both 1985 and early 1986. This provides for more meaningful reporting since fish operate on a biological cycle (roughly September to August) and the Department itself observes an April through March fiscal year.

You will find that the *financial* information covers fiscal 1985/86, the *juvenile production* information refers to releases made in the spring of 1985 (and may be from eggs obtained in fall, 1983 or 1984, depending upon the species) and the *catch figures* are for the 1985 fishing season. The catch figures reflect fish from a number of different brood years, predominantly 1979 through 1983 for chinook, for example.

It is our hope that this format will provide the type and volume of statistical information that you will find most useful, whether you are a sport fishing enthusiast, a member of the commercial fishing industry, involved with the Native fishery or simply an interested member of the public.

The stories and photographs which make up the balance of this report are intended to provide you with portraits of SEP at work. While it is not practical to report on all of the program's many activities and locations in a limited number of pages, we have sought stories that typify the kinds of activities which are presently forming the basis for enhancement of salmonids in West Coast waters.

Should your own level of interest in any of these matters require a greater amount of detailed information, please contact Salmonid Enhancement Program, Department of Fisheries and Oceans, 6th floor, 1090 West Pender Street, Vancouver, B.C. V6E 2P1. ■

The goals of SEP

When the Salmonid Enhancement Program was introduced, accountability was considered essential. The government of the time established five goal areas which were to benefit from SEP:

1 National income- the contribution to the economic welfare of Canada.

2 Regional development- the provision of employment opportunities in remote areas of B.C.

3 Native development- the provision of increased food fish, training and employment opportunities for Native people.

4 Employment- the provision of better employment opportunities through SEP's own activities and through greater opportunities in the harvesting and processing of fish produced.

5 Resource and environmental preservation- within which the program was required to increase the level of protection afforded to fish-bearing waters in B.C.

These five accounts are the bottom line by which SEP is judged. As with a business venture, some accounts may have a higher priority than others, and the areas of emphasis may change over time to respond to the changing environment within which the enterprise is operating. All five are maintained as valuable guidelines by those who work within SEP and are used to evaluate the entire program and each of its component parts.

The expenditures under SEP are expected to contribute to one or more of these accounts.

While we have not presented specific detail about the five accounts this year, we would urge that you keep the accounts and goals in mind when reading this report. ■

SEP EXPENDITURES BY PROGRAM (in Thousands of Dollars)

Program Area	1984/85	1985/86
Major Production Projects	\$ 3,691	\$ 5,017
Minor Production Projects	1,921	2,391
Pilot Production Projects	1,232	1,597
Enhancement Operations/Maintenance	15,928	14,807
Community Development Projects	4,715	4,398
Lake Enrichment	2,157	2,365
Public Involvement	1,480	1,416
Reconnaissance/Feasibility Studies	1,336	1,597
Manageability/Environmental Studies	842	667
Evaluation/Assessment Studies	1,388	975
Research Studies	774	640
Program Planning and Direction	762	580
Provincial Program (Federal share)	698	645
Provincial Program (Provincial share)	1,500	1,500
TOTAL	\$38,424	\$38,595

Source of Funds		
SEP Phase I*	\$ 17,700	\$20,000
Dept. of Fisheries and Oceans	19,244	17,095
Provincial share	1,500	1,500
TOTAL	\$38,424	\$38,595

*Phase I ended in 1983/84;
Transition Phase started in 1984/85



Hatchery tours have been a vital part of the awareness campaign.

South coast busy in 1985

South coast activities for 1985 were focused on finding the answers to technical questions, increasing production, and teaching through the public awareness campaign.

Education begins with the young; grade two students are involved in a special program, based on *Salmonids in the Classroom*, at Campbell River. A Quinsam hatchery tour is included. Grade five students are given attention with an education package, *The Quinsam Five*.

Many south coast hatcheries have been educating adults, too. *Our Resource*, an ongoing public awareness campaign, held activities at many locations including Robertson Creek, Quinsam and Puntledge. Hatchery tours often give citizens their first real understanding of the life cycle of salmonids. Some of the comments received reveal the level of enthusiasm:

"Until a person has been there, it's hard to realize how interesting it really is and how much is done to keep our supply of fish." "I enjoyed my tax dollars being utilized on this program." ■

Preparing for the Expo fishery

Everyone in B.C. knew that Expo would mean more tourists. For staff in the Department of Fisheries and Oceans the implication was that there would also be more people wanting to go fishing. There was concern about increased fishing pressure on the Georgia Strait wild stocks, especially the endangered chinook. Planning for ways to deal with this situation began in 1983.

Various options were considered by staff from the Pacific Biological Station, Field Services Branch, Planning and SEP. The one chosen was to greatly increase, through enhancement, the number of fish that would be available.

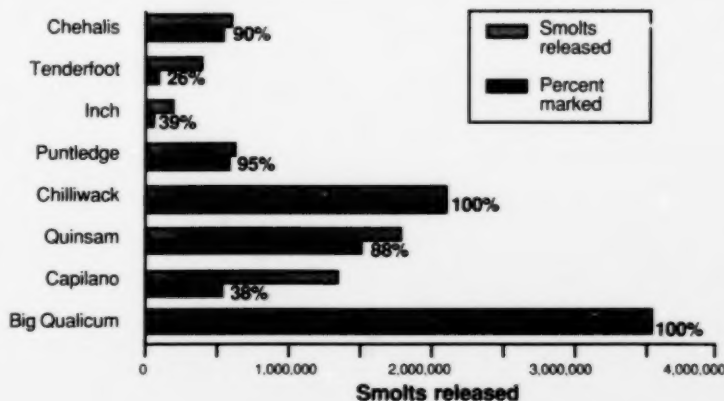
Since chinook would not provide a suitable solution due to their age composition and ocean distribution patterns, coho were the selected species. Technical evaluation had revealed that, given proper management strategies,

the increase of coho would provide good fishing and protect wild stocks of coho and chinook. Hatchery facilities for incubation and rearing of coho were expanded and the egg-take for 1983 was virtually doubled. The increase centered on the hatcheries which produce coho normally found in Georgia Strait; especially Quinsam, Big Qualicum, Tenderfoot, Capilano and Chilliwack. Rearing the extra fish for release as smolts was also part of the Expo strategy. This would assure greater numbers of adult coho for 1986.

The goal of doubled production was met -- precisely. Good luck contributed as much as good management, but the 1985 release of coho smolts was 10,800,000, exactly twice the 1984 count of 5,400,000.

Along with decisions on the species and release strategy, staff considered the question, "To mark or not to mark?" After all, the marking of 10,800,000 fish is a monumental task and due consideration had to be given to the potential benefits of the effort. Various management options could be available with marked fish; for example, a marked-fish fishery (only marked, hatchery-produced fish could be kept) would ease the pressure on wild stocks.

COHO SMOLT RELEASES CONTRIBUTING TO GEORGIA STRAIT SPORT FISHERY



Total number of smolts released (10,806,300)

Such management options justified the effort and the cost of \$280,000.

At the hatcheries involved, 1985 became a year of frantic activity. By the time the project was complete, some 9,000,000 fish had been marked (left ventral clip to identify east coast of Vancouver Island fish and the right ventral clip to identify those from the mainland and Fraser River hatcheries).

"Implementing what must be the largest marking program ever for Pacific salmon, if not for fish of all species, was a logistical nightmare because of the volume of fish and short period of time in which to do the work. Staff at the hatcheries involved deserve full credit for doing the job so well," said Ted Perry, of SEP Operations.

The marking program, in addition to providing a management tool, was designed to provide information on the mortality rate associated with removal of the ventral fin as well as the regeneration rate of clipped ventral fins. Both test and control groups were released; adipose, coded-wire tagged fish with and also without the ventral clip.

Plans for the 1986 fishery called for using the ventral mark recovery rate as a backup to the normal coded-wire tag program for catch assessment. The large number of marked fish will also provide an opportunity to measure the straying rate of adults which entered rivers to spawn in 1986.

The response to the anticipated Expo problem created an opportunity; a chance to carry out a large-scale experiment with alleviation of coho and chinook conservation problems as the payoff. Information that will be available by the end of 1986 will show how well the experiment worked; whether the additional coho remained inside Georgia Strait or migrated out, whether survival rates were maintained despite higher numbers and whether the marks proved useful as a regulatory mechanism.

The answers will be interesting no matter what they tell us. They may even change some perspectives on enhancement in the future. ■



People are amazed to learn how much information is on a coded-wire tag.

Mark Recovery Program uses catch statistics to unlock secrets for SEP

Fish migrate. Knowing which fish turn up in what fisheries, and in what numbers, is essential for fisheries management and for SEP planning. The Mark Recovery Program (MRP) provides this information.

One fish looks much like another, so a way to identify specific groups is essential. It comes in the form of a tiny (1 mm long) wire, etched with a code. When the fry are about to be released, a coded-wire tag is inserted into the cartilage of the nose, and the adipose fin is clipped as a visible form of identification.

Heads of marked fish are later recovered, the tags located by magnet and the codes read.

In 1985, MRP processed a record number of commercial, sport and escapement recovered fish heads; 63,629. This was an increase of 40 percent over 1984.

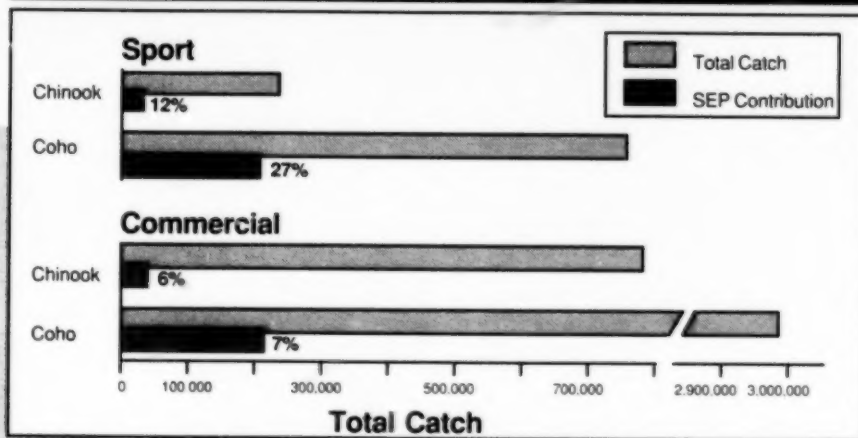
A major reason for the increase was heightened public awareness. While marked fish from the commercial

catch are found by taking samples, those from sport-caught fish are recovered only if individuals note the missing fin, understand its meaning, and turn the head into one of the 234 depots around B.C.

The MRP put extra effort into creating awareness in 1985, partly to prepare for the 1986 fishing season when the catch of extra coho, released for Expo 86 tourism, was expected to be very large. Since the nine million additional coho had all been marked with either right or left ventral fin clips, it was important that the fishing public understood the difference between these clips and the adipose (tagged fish) clip. To prevent thousands upon thousands of Expo coho heads inundating MRP, there was a vastly increased education effort.

The results, for 1985, were that people became more aware of fin clips in general, and submitted almost twice as many heads from adipose clipped fish as before. ■

SEP CONTRIBUTION TO 1985 SPORT AND COMMERCIAL CATCHES



SEP CONTRIBUTION TO 1985 SPORT AND COMMERCIAL CATCHES (BY AREA)

North Coast (Commercial)

	Catch	SEP	SEP%
Chinook	266,000	28,000	10.5
Coho	906,000	19,000	2.0

Vancouver Is.(W. coast)/North Coast(Sport)

	Catch	SEP	SEP%
Chinook	25,000	6,000	24.0
Coho	36,000	3,000	8.0

Georgia Strait (Sport)

	Catch	SEP	SEP%
Chinook	235,000	26,000	11.0
Coho	728,000	207,000	28.0

South Coast (Commercial)

	Catch	SEP	SEP%
Chinook	487,000	21,000	4.0
Coho	2,062,000	199,000	9.5

Fraser (Commercial)

	Catch	SEP	SEP%
Chinook	25,000	300	1.0
Coho	17,000	3,000	17.5

E

ngineering puts Shuswap hatchery into production

The pilot project on the Shuswap River was given production status in 1985. A new well and permanent buildings for the operation were the focus of engineering efforts at the site near Lumby. With the new treaty signalling the beginning of enhancement opportunities on the Fraser River, technologies will be tested at Shuswap for application to other rivers in the system.

The Shuswap hatchery has been designed for maximum flexibility. The process of fish culture on the up-river parts of the Fraser is still experimental and for that reason the facility is committed to no specific production targets. Its mission, for the next few years at least, will be to provide a learning experience. Not only technology, but also such things as proper release strategies will be investigated.

"It will allow us to turn out numbers that are statistically valid for testing," explains Bruce Shepherd, head of SEP's New Projects Unit.

The Shuswap hatchery is somewhat unique in that it concentrates on serving a recreational fishery. It will have egg capacity for 200,000 coho and 1.6 million chinook. The latter species was, in past years, the foundation of an active sport fishery on the Shuswap each fall. This provided recreation for the local residents and tourism opportunities for local businesses. Gradually, however, the populations declined and the sport fishery was closed to preserve the runs.

Shuswap will focus on experimental work relevant to all potential Fraser system efforts. Rearing strategies, time and size at release studies and investigation of hatchery versus wild interactions will provide a valuable information base.

The Shuswap pilot project found that hatchery production for the chinook runs could be effective, so in



The Minister of Fisheries and Oceans, Tom Siddon, opened the Shuswap hatchery in October 1986, then got right to work helping the crew.

1985 construction began on the permanent facility.

A heavy concentration of iron in the water supply was one problem the project faced. A new well was drilled and the water from it proved to be of higher quality. With that problem solved the facility could proceed without need for elaborate treatment operations. The water stays at 8° to 9° C throughout the year and a constant flow is assured by a backup generator to supply power if the electricity goes off.

The hatchery also uses new communication and monitoring technology. No one lives on the site. The nearest staff member is located about two kilometres from the hatchery and the alarm system will phone all staff automatically and in preselected order if an emergency condition should arise. The system also triggers the appropriate response, such as switching on a new well, as soon as a problem is detected.

Modern technology at work, a recreational fishery to rebuild and an opportunity to investigate, at production levels, enhancement opportunities on the Fraser system; Shuswap hatchery should more than justify the time and expertise that engineering devoted to the project in 1985. ■

Provincial participation on the Nicola

The Nicola River has been under investigation for the past six or seven years, almost since the start of SEP, but the low summer flows and competing uses have been causing problems there for 50 years or more.

Steelhead, chinook, coho and pink are all native to the Nicola system, but their numbers have been low and decreasing. The whole Nicola valley dries up in the summer months and that in itself would leave little water for rearing salmonids. The problem has been intensified since the valley was developed for ranching and farming; summer also sees a high water demand for crop irrigation and livestock.

When SEP began investigating possible cures for the problem, it was obvious that the plan to be

developed would have to include benefits for farmers as well as for fish. Two federal departments, Agriculture and Fisheries and Oceans, were obviously involved. So, especially because of the resident trout and steelhead populations, was the provincial Fisheries Branch. Water Management, B.C. Ministry of Environment and the provincial Department of Agriculture were also involved in the effort.

The Nicola project had to produce reasonable irrigation flows, better fish habitat and good flood control.

"A higher than usual level of cooperation between fisheries and water

management was required," says Dr. Art Tautz, director of the Fisheries Research Section, Fisheries Branch. The newness of the approach meant that extensive studies were required and a consultative process among the concerned agencies was needed.

A dam was proposed as a way to control the level of Nicola Lake and provide predetermined water releases to benefit both fisheries and agriculture. Better screening was needed to prevent fish being sucked up by irrigation intakes. Studies had to be undertaken to try to determine the best times for water releases and the ideal volumes that might be created. It was a complex planning process.

DFO and the B.C. Ministry of Environment persevered in the federal-provincial effort. The dam and fishway were under construction in 1985 and spawning platforms were to be built in 1986. Hopefully, it will not be long before the new approach will provide real benefits to all. ■

Construction of the Nicola Dam began in 1985. Benefits include flood control, irrigation, and improved fish habitat.





Side channels for chum are producing a bonus of coho

Some enhancement techniques turn out to be more productive than expected. SEP has been involved in the design, construction and assessment of groundwater-fed side channels for several years. It is no longer a novel enhancement concept; some 24 of these unmanned, combination spawning and rearing channels have been built on a number of river systems in the province. Although originally intended to extend and improve spawning habitat for chum salmon, side channels provide excellent spawning and rearing habitat for coho as well.

"Now we are investigating the possibilities of extending the technique to sockeye and pink salmon enhancement, having built our first sockeye channel on the Kitsumkalum River and our first pink channel on the Kitwancool River, both on the Skeena system in northern B.C.," says Gary Logan of SEP's Small Projects Unit.

Upper Paradise Valley channel, located at the Cheakamus River near Squamish, is typical of the chum and coho channels, and is one of three projects being assessed over the long term. The channel is about 30 centimetres deep and approximately 420 metres long by 6 metres wide. The project site was an old flood course that had been scoured out by overland flow. A dyke, constructed a few years before development in 1982, blocked off the upstream end of the channel and prevented seasonal freshets from re-entering.

The old flood course route was excavated deeper to intercept groundwater along its entire length, and wider to maximize the area of spawning and rearing habitat available. Next, to compensate for the slight gradient, a series of low wooden weirs were installed across the channel at about 50 metre intervals to maintain uniform water depth. A bed of clean, size-graded (1.3 - 10.2 cm) spawning gravel 30 centimetres deep was added. Finally, large quarry rock or riprap was placed around the channel perimeter to a height just above the waterline to prevent the

bank from being undermined by spawning fish. Construction costs totalled \$22,000.

Logan reports that assessment studies have been conducted:

"Numbers of adult chum spawners have ranged between 2,500 and 6,500, averaging 4,300. Estimates of coho spawners ranged between 50 and 450 annually. The larger number, returning in 1985, originated from the

first coho spawning in the new channel.

"Juvenile production has averaged about 1.1 million chum fry (420 fry per square metre of channel area) and 7,200 coho smolts (2.8 smolts per square metre of channel area)."

Assuming these statistics are representative of the average annual carrying capacity of the channel, subsequent adult production, calculated by applying the SEP biostandards, should average 15,400 chum and 1,080 coho each year. Under current management practice, up to 40 percent of chum and 85 percent of coho are destined to be harvested by fisheries. ■

**Innovation has provided SEP
with enhancement at less cost.**

The "waterless" incubator

A waterless incubator does, of course, use water -- there is no other medium for incubation of salmonid eggs. What the new approach actually involves is moist incubation. Thus the amount of water required can be greatly reduced. Continual flow is only required when it is almost time for the alevins to hatch.

The moist incubator has been under development by SEP engineers and biologists since 1983, although the underlying principle was known long ago. Even in the last century, eggs, packed in moist cotton and melting ice, were kept alive for transport. The idea was adapted recently to produce a sealed incubation unit which is periodically flooded with water and then drained. This leaves enough moisture on the eggs to keep them viable until the next immersion. Each cycle is about 4 hours; approximately 3 3/4 hours moist and about 20 minutes of flooding. The

eggs become thoroughly wetted and flooding also flushes the ammonia from them.

During the period between immersions, a small amount of water remains in the bottom of the unit to maintain humidity. The eggs get sufficient oxygen as the water that coats them picks it up from the surrounding air.

Fresh water can be used for each flooding of the chamber or the same water can be filtered and recirculated.

This system has some significant advantages. For example, the cost of supplying warmed water to speed egg development in the north would be prohibitive if a constant flow of fresh water were required. With the moist incubation technique, only a small volume of recycled water is necessary; it can be heated and kept warm at minimal cost. As well, if a time-release medication program is needed on a project the amount of medication needed can be greatly reduced (at a substantial saving) if this method is used. Specific sites will no doubt find other benefits.

Innovation --- finding better ways to do the job at less cost --- is encouraged in all areas of SEP. ■

Sechelt hatchery fish come home to a spot in the ocean

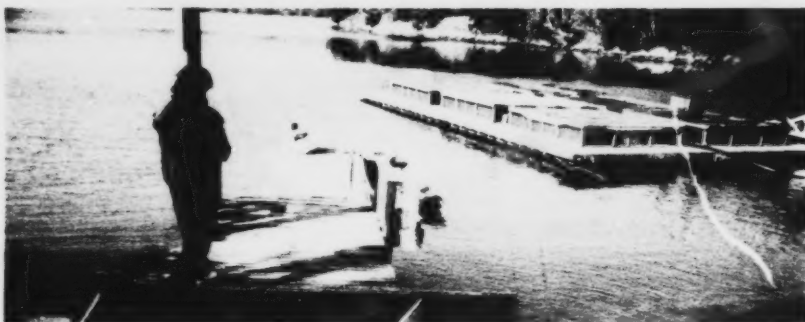
For fish returning to the hatchery operated by the Sechelt Band on the Sunshine Coast, home is not a specific stream, it is a spot in the ocean where a netpen was anchored when they became smolts.

This unusual arrangement leads to another. The fish school at that spot each fall and the hatchery has no problem locating their broodstock; they just go out to the site and scoop them up.

The netpen rearing project was

not initiated to facilitate easy broodstock capture, of course. The aim was to increase production. The use of pens allows Sechelt to raise four times as many coho as they could if the fish were all kept at the land facility.

The hatchery itself is not located on a river and has to bring its water supply in by pipeline. Fresh water is also piped to the seapens to provide a smolting environment. The fish seek their own level of salinity by moving to different depths within the



SEP at work in the communities

The Community Economic Development Program (CEDP) operated in 30 small communities scattered through B.C. These contracted projects have not only added fish to B.C. waters; they have produced trained people in areas that have great enhancement potential.

The project at Kincolith is a good example of northern CEDP projects. The staff there have had to cope with cold weather and adapt to the peculiarities of local stocks. The chinook at Kincolith spawn in August, but the coho are not ripe until November. For a northern project holding fish in November there are special problems; breaking the ice to

get at the broodstock for one.

The climate also leads to smaller fry at release; the cold water temperatures retard their development. As well, Kincolith's gravity-fed water system had to be drained before freeze-up each year. This became the factor that determined the time of release.

In 1985, the project was able to use new rearing ponds, supplied with groundwater. This means that they can now overwinter the coho and will also be able to overwinter chinook. Feeding them through the winter has been shown to significantly increase survivals and that should result in increased fish catches from Kincolith.

The new ponds are also being used as a holding facility for adult chinook, reducing stress and minimizing prespawning mortalities. The long-term results of that should be increased production.

Other northern projects are

pens. This innovation has been very effective.

The effort is paying off with rebuilt runs to a number of area streams. Escapement figures for 1979 revealed no coho and only 600 chum. In 1985, the count was 450 coho and 2,400 chum; a fourfold increase over a period of six years.

The hatchery draws visitors, too, and is solidly connected to the community.

"It's not our hatchery," says manager Sid Quinn. "It's everyone's hatchery."

"Everyone" includes local school groups, casual tourists and many of those who come to the Sunshine Coast seeking more information on the developing aquaculture industry in the area. A visit to the Sechelt hatchery gives them a chance to learn about fish and fish culture on a firsthand basis. It also gives them a chance to see a community project that is meeting all its objectives for the resource and the people. ■

Waiting for returns at the Sechelt netpens.

similarly successful. Masset had an easier time with chinook broodstock collection in 1985 as the first returns from that project came in. The run to the Yakoun River is the only chinook run in the islands so this opportunity to build into the second generation will add significant production values to this project as well as having value in maintaining a unique stock.

Hartley Bay is using increased skill and local knowledge for another technique; the project is experimenting with outplants of coho to an unutilized lake. Smolts leaving the river were monitored and the data demonstrated that outplants from the upper (inaccessible) of the system's two lakes were a substantial addition to the total.

Since the area around Hartley Bay abounds with such potential outplant sites, a proven enhancement technique and trained people in the area could be used to generate significant contributions to the fisheries in a remote part of the province. ■

People are active in SEP

The public gets involved with SEP -- literally. Over 8,500 individuals took part in enhancement activities during 1985. They operated over 200 projects scattered throughout the province. To keep this many enthusiastic volunteers interested and informed is a difficult task, especially in light of their geographic dispersal.

One of the ways SEP meets their needs is by publishing a newsletter for the volunteers. The *PIPnews*, with its enclosed *Tipsheets*, provides technical information, tips and news items of interest to PIP volunteers. The excerpt and photo presented here shows you something about PIP and something about *PIPnews*, too. It appeared in the April, 1986 issue. ■

Keeping the public eye on SEP

It's called the Salmonid Enhancement Task Group. It has 21 members who represent the general public and the various user groups who benefit directly from the West Coast fisheries. Its task is to give the program guidance and advice, provide a direct link for feedback to SEP managers and take an active role in SEP planning.

The Chairman of the Task Group is also a member of the Salmonid Enhancement Board. The Board provides advice to the Minister on matters relating to SEP.

The Task Group is another of the ways that SEP maintains its strong connections to the general public, industry groups, taxpayers and consumers. ■



Broodstock capture is one of many volunteer activities.

PIPnews story

"I got started on this about four years ago," says Rick Schmidt, "just helping out on egg-takes and things. All that we had here until this spring was a pumphouse and an incubation box."

But Rick got hooked. Now the project near Langdale has a shed/workshop, covered fry clipping table, adult "condominiums," two Capilano troughs and a large cement rearing tub. The group, headed by Rick and Darin Macey, is working on four area streams and two species. The project has become a tourist attraction in the area, and has received visitors from as far away as England and Sweden. Rick has now taken on full responsibility for it all.

A chum egg-take was underway when *PIPnews* came to call, and the crew was busy capturing broodstock from Oullette Creek beside the hatchery. The enhancement effort is directed at chum and coho, and the group is working on the Rainy River, McNair and Dakota Creeks as well as Oullette.

The development of the

project, from its humble status last spring, is remarkable. The hatchery shed/workshop is a substantial building. The outdoor work area is fully floored with planking so that the volunteers will be able to feed fish without sinking into the mud. The new adult holding facilities and incubation boxes are solid. The value of donated lumber and equipment is reflected in the sturdy construction of everything on the site. The value of 12,000 hours of volunteer labour is also evident in the workmanship.

With the new incubation boxes in use, the project now has a capacity of 120,000 chum and 40,000 coho eggs.

The group is becoming more involved in serving as an educational facility for local schools and youth groups. They are accommodating the flow of interested visitors by holding open house events at the site.

In the meantime, the Thornbrough Channel group is undertaking an increased amount of habitat improvement.

"It seems that, once you increase the number of fish, you just have to do that, too," says Rick. "They need the habitat to survive." ■

To see is to understand

Education is an important thrust for SEP; today's child will guard our resource in the future. The Educator's Package, *Salmonids in the Classroom* was prepared to serve teachers. Other elements are equally effective. In 1985, a short video production, *A Good and Careful Harvest*, was made available to schools. The show was the first of a trilogy on the three West Coast fisheries. It was designed to teach children about the commercial fishery and it has been very well received. The program won the International Association of Business Communicators (B.C. Chapter) Award of Excellence in audio-visuals for 1985. ■

The white-coat brigade

Research plays a vital role in SEP; it provides answers to questions on water quality, fish nutrition, best times and optimum sizes for releases of the various species. It also provides techniques to help Nature to produce bigger, healthier or more commercially-attractive fish.

Fisheries Research Branch through the Pacific Biological Station and its West Vancouver Research Laboratory, has been active in SEP-funded research since the program began. Recent work has included producing all-female chinook sperm for use in fertilization (especially promising as a technique to increase hatchery egg-takes and thus restore reduced chinook populations), formulating Canadian diets for fish, devising a timetable to advise when chinook are in greatest danger of developing nutrition-related cataracts and investigating the reasons for high mortalities of chinook alevins at the Chehalis hatchery.

All of this work is important for SEP and for the growing aquaculture industry as well. Much of it is recognized around the world as being outstanding in the field of fish biology. The two stories on these pages are only a sample -- but one that we hope you will find significant and revealing. ■



Dr. Ed Donaldson explains to a visiting delegation from China the chinook research program which results in all-female milt.

World-class research

Worldwide attention has been directed at research, partially funded by SEP, on controlled reproduction, fish genetics, incubation, nutrition and other factors of importance to both the traditional fishery and the aquaculture industry.

One of the stories that received coverage in 1985 was on studies into acceleration of salmon growth rates. Use of a recombinant pituitary protein -- somatotropin -- has been under study by a group at the West Van Research Laboratory. Their report, the first on this subject in the world, was made in 1985. The report itself also made history; it was the first fisheries paper ever published in *Bio/Technology*, appearing in Vol. 3, No. 7, July 1985.

The study confirmed the effectiveness of the technique. When test results were analysed, it was found that the control group of fish (untreated) went from 4 grams to 8 grams in a six-week period. The treated group went from 4 grams to 12; gaining twice as much weight as the untreated fish.

The implication of this for

fish farmers is clear, since keeping and feeding fish is expensive. It could also lead to better survivals for fish produced in hatcheries for the traditional fisheries, since release of some species at optimum size would mean keeping them past optimum time or using heated water.

The world press found the story worth attention. Articles appeared in the *Sunday Times* in London, in the *Toronto Globe and Mail* and in *USA Today*.

The research team, Jacqueline A. Gill, John P. Sumpter (who took part while on a fellowship from the United Kingdom), Edward M. Donaldson, Helen M. Dye, Larry Souza, Thor Berg, Jette Wypych and Keith Langley, can take satisfaction from the fact that they not only produced valuable and interesting results -- they also made people aware of them. The West Vancouver Research Laboratory, long known to experts in salmon culture and biology, is gaining a bigger audience. ■

Fast food for sockeye

The lake fertilization program is a supply and demand balancing act. The level of food available in nursery lakes helps to determine the number of smolts that can be produced and the size that they can achieve before they migrate to the ocean. If the demand for food can be met, by boosting the level of nutrients at the start of the food chain, we can expect more fish to survive.

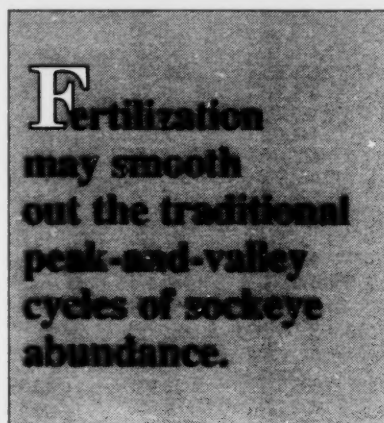
With this in mind, and with the new treaty between Canada and the United States now in place, the lake fertilization team has been looking closely at the prospects for using the technique on lakes in the Fraser system.

Chilko, Adams and Quesnel lakes were all under study during 1985. These lakes present some new challenges to the fertilization experts. Each lake must be examined to see how much stratification of water occurs, how much seasonal fluctuation can be found in nutrient levels, and to assess the current status of sockeye population rearing in it.

Chilko Lake has been under study since 1983. Research has shown that it is subject to considerable vertical mixing due to wide temperature variations between the north and south ends. This, in turn, sets up currents within the lake which could make it hard to achieve proper distribution of fertilizers. During 1985, a set of temperature readings was taken at intervals from the lakebed to the surface. When the results have been analysed the information may provide valuable clues into the thermal conditions in the lake. This could provide guidance on how to adjust a fertilization program to overcome

distribution problems.

Another feature of Chilko Lake that has baffled researchers for years is difficulty in getting an accurate assessment of the biomass, or numbers of juvenile sockeye salmon, in the lake. This is normally done by hydroacoustics; a method that requires that sound waves bounce back from the mass of fish. In Chilko Lake, in the past, this technique has failed, perhaps because the fish tend to remain too near the surface. If the acoustic device is not



far enough from the "target" it is unable to receive a reading. A hydroacoustic test worked in 1986, however, and estimates of juvenile fish densities and distribution were obtained for the first time in decades.

The research into Chilko Lake has helped to define some of the important differences between coastal lakes and those found beyond the coast mountains. The next step will be to try to determine how to adjust for the differences when planning a fertilization program. The researchers are investigating the possibility of using lake fertilization to smooth out production of sockeye from Fraser systems to overcome cyclic dominance problems facing the industry. At

present the cyclical variation in numbers creates some very good and some very poor fishing years. This might require fertilization during peak cycle years or, conversely, during low cycle years. Study of these alternatives is proceeding. Another possibility may be to use fertilization in combination with other enhancement techniques, such as incubation boxes, to create an immediate increase in the overall number of fish in a given lake. A boost in the basic nutrients can lead to a greater supply of fish "groceries" but that will not have much value unless a lake contains enough fish to feast on them. ■

How to read SEP fish production table (p.14)

This table shows the number of adult fish expected (during the years 1987 to 1989, depending on the species) to result from 1985 releases, and the anticipated contribution to catches.

For example, Big Qualicum project released 23,970,000 chum juveniles in 1985. These should result in an adult population of 167,790, of which 77,183 will be caught in the various fisheries. ■

1985 SEP FISH PRODUCTION

(BY PROJECT)

PROJECT	SPECIES	JUVENILES RELEASED	ADULTS EXPECTED	CATCH EXPECTED
■ ENHANCEMENT OPERATIONS				
BIG QUALICUM PROJECT	Chum	23,970,000	167,790	77,183
	Coho	3,522,034	352,203	250,945
	Chinook	3,780,332	75,607	51,413
	Steelhead	62,224	1,717	859
BIRKENHEAD HATCHERY	Coho	27,700	2,770	1,984
	Chinook	115,966	116	35
CAPILANO HATCHERY	Coho	1,777,105	138,105	72,989
	Chinook	1,649,830	28,047	22,466
	Steelhead	16,366	542	271
	Chum	13,990,725	237,842	100,467
CHEHALIS HATCHERY	Coho	622,450	62,244	44,582
	Chinook	448,534	4,966	3,933
	Steelhead	86,765	3,470	2,082
	Cutthroat	5,912	591	396
CHEMAINUS HATCHERY	Coho	68,137	681	485
	Chinook	79,159	1,583	1,076
CHILLIWACK HATCHERY	Chum	3,410,092	57,972	24,488
	Coho	2,635,582	226,485	162,220
	Chinook	978,395	10,762	8,524
	Steelhead	163,315	4,039	2,424
CLEARWATER HATCHERY	Coho	144,107	2,882	2,064
	Chinook	677,105	7,448	2,234
CONUMA HATCHERY	Chum	19,457,697	327,917	213,146
	Coho	229,035	10,592	6,037
	Chinook	1,865,199	14,922	7,879
	Coho	1,137,215	21,199	15,184
EAGLE HATCHERY	Chinook	579,447	5,538	1,661
	Sockeye	150,540,000	1,490,346	772,744
GATES CREEK PROJECT	Sockeye	14,800,000	148,000	69,101
	Chum	7,387,310	125,585	53,048
	Coho	231,181	23,119	16,559
	Cutthroat	24,202	2,420	1,621
KITIMAT HATCHERY	Chum	1,995,537	33,924	18,658
	Coho	602,022	60,202	29,348
	Chinook	1,976,138	23,714	13,873
	Steelhead	65,143	1,954	977
LITTLE QUALICUM PROJECT	Chum	24,288,462	185,462	85,313
	Chinook	1,140,747	22,815	15,514
	Steelhead	29,298	1,172	586
	Sockeye	4,138,000	33,104	17,164
NADINA PROJECT	Chum	26,226,725	404,636	263,013
	Coho	75,585	2,268	1,245
	Chinook	2,351,543	32,922	17,383
	Chum	10,333,847	190,034	94,067
PALLANT HATCHERY	Coho	349,762	8,744	3,893
	Sockeye	69,600,000	689,040	357,267
	Chum	7,384,575	125,538	57,747
	Coho	4,256,524	82,142	58,526
PINKUT PROJECT	Chinook	1,254,742	25,094	17,064
	Steelhead	36,662	1,466	733
	Cutthroat	1,747	175	117
	Chinook	1,908,040	17,475	5,242
QUINSAM HATCHERY	Pink	4,404,164	37,718	22,631
	Coho	1,954,122	187,390	133,515
	Chinook	3,156,571	60,988	41,472
	Steelhead	21,216	849	424
ROBERTSON HATCHERY	Coho	1,601,236	80,062	43,954
	Chinook	8,239,134	115,179	60,815
	Chinook	118,880	1,308	392
	Chum	8,358,161	117,908	64,201
SNOOTLI HATCHERY	Coho	107,511	538	381
	Chinook	1,058,579	5,573	3,079
	Steelhead	101,950	652	326
	Coho	60,500	1,210	867
SPIUS HATCHERY	Chinook	300,985	3,311	993

PROJECT	SPECIES
TENDERFOOT HATCHERY	Coho Chinook Steelhead
UPPER PITT PROJECT	Sockeye
WEAVER CREEK PROJECT	Sockeye Chum
WHITEHORSE HATCH.	Chinook
■ COMMUNITY DEVELOPMENT	
BARRIERE HATCHERY	Coho
BELLA BELLA HATCHERY	Chum
CHEHALIS HATCHERY	Chum
COWICHAN HATCHERY	Chum Coho Chinook
DEEP COVE NET PENS	Coho Chinook
FALSE CREEK PENS	Coho
FT. BABINE HATCHERY	Coho
FT. ST JAMES HATCH.	Chinook
HARTLEY BAY HATCH.	Coho
KENNEDY PILOT HATCH.	Coho
KINCOLITH HATCHERY	Chinook
KISPIOX HATCHERY	Coho Chinook
KITSUMKALUM HATCHERY	Coho Chinook
KLEMTU HATCHERY	Chum Coho
MASSET HATCHERY	Sockeye Coho
NANAIMO HATCHERY	Chum Coho Chinook
NIMPKISH HATCHERY	Sockeye Chum Coho Chinook
OWEEKENO HATCHERY	Chum Chinook
PENNY PILOT HATCHERY	Chinook
PORT HARDY-QUATSE HATCHERY	Chum Pink Coho Steelhead
PORT HARDY- STEPHENS HATCHERY	Chum Pink Coho
POWELL RIVER HATCHERY	Chum Coho
SAN JUAN HATCHERY	Coho Chinook
SECHELT HATCHERY	Chum Coho Chinook
SEYMOUR HATCHERY	Coho Steelhead
SKIDEGATE HATCHERY	Cutthroat Chum
SLIAMMON HATCHERY	Coho Chum
TERRACE HATCHERY	Coho Chinook
THORNTON HATCHERY	Steelhead Chum Coho Chinook
TOBOGGAN HATCHERY	Steelhead

JUVENILES RELEASED	ADULTS EXPECTED	CATCH EXPECTED
391,489	39,148	20,690
183,970	3,127	2,505
78,793	505	253
3,710,000	25,970	12,125
45,400,000	454,000	211,973
1,978,135	13,847	5,849
127,320	229	9
157,394	4,057	2,906
1,061,709	20,172	10,984
912,200	6,385	2,697
971,923	6,803	3,129
208,959	3,399	2,422
187,823	3,756	2,554
133,647	13,334	7,047
47,217	802	642
16,315	1,632	863
25,606	2,561	1,169
164,908	1,814	544
28,250	848	92
12,413	372	204
38,936	70	21
51,000	1,530	697
93,017	1,501	623
14,630	293	134
22,803	41	17
337,552	6,413	3,492
19,631	589	417
12,720	114	59
66,000	6,600	2,587
774,078	13,159	6,053
231,404	2,314	1,649
350,597	7,012	4,768
2,710,715	24,396	13,662
103,475	1,759	809
42,019	840	569
109,004	196	125
74,167	1,409	986
47,866	431	238
139,954	140	42
91,100	1,549	713
1,570,600	10,994	6,596
280,690	6,254	4,233
29,123	638	319
590,000	4,925	3,201
80,800	566	340
178,640	2,144	1,222
51,950	883	389
153,725	2,905	1,535
1,234,245	16,251	8,922
367,000	807	426
44,800	314	138
43,709	4,371	2,310
24,642	694	556
20,850	626	331
13,996	97	49
783	13	9
500	4	2
950	29	13
869,000	14,773	6,500
4,739	474	249
259,873	1,493	619
9,010	90	45
288,960	2,023	1,315
157,785	8,463	4,646
80,152	617	326
54,794	351	176

PROJECT	SPECIES	JUVENILES RELEASED	ADULTS EXPECTED	CATCH EXPECTED
■ PUBLIC INVOLVEMENT PROJECTS				
216 PROJECTS	All species	3,917,010	68,451	35,893
■ SMALL PROJECTS UNIT				
ALOUETTE RIVER HATCHERY	Chum	249,000	4,233	1,788
	Coho	86,581	8,658	6,201
	Steelhead	44,000	1,760	1,056
	Cutthroat	38,000	3,800	2,546
BILLY HARRIS CHANNEL	Chum	1,500,000	21,000	8,871
	Coho	11,240	1,124	805
	Chum	500,000	7,000	2,957
CHILQUA SLOUGH CHANNEL	Chum	500,000	7,000	2,957
COLONIZATION PROJECTS	Coho	271,413	3,375	2,405
	Steelhead	829	5	3
ED LEON CHANNEL	Chum	1,750,000	24,500	10,349
	Coho	8,700	870	623
HOPEDALE SLOUGH CHANNEL	Chum	150,000	2,100	887
	Coho	4,000	400	286
JUDD SLOUGH CHANNEL	Chum	1,500,000	21,000	9,240
	Coho	7,800	780	412
LOWER PARADISE CHANNEL	Chum	350,000	4,900	2,156
	Coho	1,300	130	69
MAMQUAM CHANNEL	Chum	1,370,000	19,180	8,439
	Coho	4,500	450	238
PEACH CREEK CHANNEL	Chum	700,000	9,800	4,140
	Coho	4,500	450	322
RAILROAD CREEK CHANNEL	Chum	350,000	4,900	2,070
	Coho	250	25	18
UPPER PARADISE CHANNEL	Chum	700,000	9,800	4,312
	Coho	13,300	1,330	703
VANCOUVER BAY	Coho	56,218	1,617	854
	Chinook	19,820	54	43
WESTHOLME SIDE CHANNEL	Chum	1,500,000	21,000	9,660
	Coho	1,300	130	93
WORTH CREEK CHANNEL	Chum	326,000	4,564	1,928
	Coho	8,000	800	573
■ PROVINCE OF B.C.				
FRASER VALLEY	Steelhead	612,383	6,624	3,974
TROUT HATCHERY	Cutthroat	50,850	3,529	2,364
LOON CREEK HATCHERY	Chinook	128,460	128	38
	Steelhead	41,790	1,254	752
VANCOUVER ISLAND TROUT HATCHERY	Steelhead	265,990	6,788	3,394
	Cutthroat	14,805	1,481	992
■ LAKE ENRICHMENT				
BONILLA LAKE	Sockeye	465,750	20,959	8,384
CURTIS LAKE	Sockeye	235,638	10,504	4,202
DEVON LAKE	Sockeye	92,852	4,178	1,671
GREAT CENTRAL LAKE	Sockeye	12,355,251	555,986	339,151
HENDERSON LAKE	Sockeye	2,509,080	112,909	68,874
KENNEDY-CLAYOQUOT	Sockeye	1,944,720	87,512	53,382
LONG LAKE	Sockeye	3,133,200	140,994	77,547
MURIEL LAKE	Sockeye	101,520	4,568	2,786
NIMPKISH-WOSS LAKES	Sockeye	8,231,932	370,437	207,445
QCI LAKES	Sockeye	1,603,780	72,171	37,546
■ FISHWAYS AND SMALL PROJECTS				
TOTAL 6 PROJECTS	Pink	10,700,000	75,000	45,000
	Coho	3,100,000	2,500	1,692
	Chinook	91,000	100	64
	Steelhead	31,000	200	100

1985 SEP FISH PRODUCTION

(BY PROGRAM AND SPECIES)

PROGRAM AREA	NO. of PROJECTS	SPECIES	JUVENILES RELEASED	ADULTS EXPECTED	CATCH EXPECTED
ENHANCEMENT OPERATIONS (hatcheries/spawning channels)	30	Sockeye	288,188,000	2,840,460	1,440,374
		Chum	148,781,266	1,988,455	1,057,180
		Pink	4,404,164	37,718	22,631
		Coho	19,793,297	1,301,984	865,467
		Chinook	31,990,616	460,724	277,562
		Steelhead	925,584	24,116	15,854
		Cutthroat	31,861	3,186	2,134
			494,114,788	6,656,643	3,681,202
COMMUNITY DEVELOPMENT PROJECTS (community hatcheries/ seapens/spawning channels)	28	Sockeye	2,723,435	24,510	13,721
		Chum	6,171,414	80,571	40,408
		Pink	1,651,400	11,560	6,936
		Coho	3,082,601	79,886	44,220
		Chinook	1,933,792	19,374	11,502
		Steelhead	106,923	1,176	589
		Cutthroat	783	13	9
			15,670,348	217,090	117,385
SMALL PROJECTS (habitat/spawning/ side channels/joint venture hatcheries)	15	Chum	11,118,800	156,013	67,693
		Coho	479,102	20,139	13,602
		Chinook	19,820	54	46
		Steelhead	44,829	1,765	1,056
		Cutthroat	38,000	3,800	2,546
			11,700,551	181,771	84,943
PUBLIC INVOLVEMENT PROJECTS (habitat/hatcheries/ incubation boxes)	216	Sockeye	1,200	11	6
		Chum	1,194,590	14,666	8,120
		Pink	24,125	169	90
		Coho	2,117,309	47,626	25,889
		Chinook	538,506	6,135	3,219
		Steelhead	32,132	471	256
		Cutthroat	9,148	678	454
			3,917,010	68,451	35,893
PROVINCE OF B.C. (hatcheries)	3	Chinook	128,460	128	38
		Steelhead	920,16	14,666	8,120
		Cutthroat	65,655	5,010	3,356
			1,114,278	19,804	11,514
LAKE ENRICHMENT PROJECTS	10	Sockeye	30,673,723	1,380,218	800,988
FISHWAYS AND SMALL PROJECTS (fishways/diversions/side channels)	6	Pink	10,700,000	75,000	45,000
		Coho	3,100,000	2,500	1,692
		Chinook	91,000	100	64
		Steelhead	31,000	200	100
			13,922,000	77,800	46,856
TOTAL PRODUCTION			571,112,698	8,601,777	4,778,781
		Sockeye	321,586,358	4,245,199	2,255,089
		Chum	167,266,070	2,238,400	1,171,260
		Pink	16,779,689	124,447	74,657
		Coho	28,572,309	1,452,135	950,870
		Chinook	34,702,194	486,515	292,428
		Steelhead	2,060,631	42,394	25,978
		Cutthroat	145,447	12,687	8,499
TOTAL PRODUCTION BY SPECIES			571,112,698	8,601,777	4,778,781